

PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

PCT

To:

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DANEMARK

PA 79597 OC

10 FEB 2006

10 not AP

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL PRELIMINARY
REPORT ON PATENTABILITY

(PCT Rule 71.1)

BY FAX IN ADVANCE 10-02-2006

Date of mailing
(day/month/year)

10.02.2006

Applicant's or agent's file reference
79597 OC/No

IMPORTANT NOTIFICATION

International application No.
PCT/DK2004/000655

International filing date (day/month/year)
28.09.2004

Priority date (day/month/year)
29.09.2003

Applicant
DEMEX R DGIVEN DE INGENI RER AS ET AL.

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary report on patentability and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. REMINDER

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary report on patentability. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

The applicant's attention is drawn to Article 33(5), which provides that the criteria of novelty, inventive step and industrial applicability described in Article 33(2) to (4) merely serve the purposes of international preliminary examination and that "any Contracting State may apply additional or different criteria for the purposes of deciding whether, in that State, the claimed inventions is patentable or not" (see also Article 27(5)). Such additional criteria may relate, for example, to exemptions from patentability, requirements for enabling disclosure, clarity and support for the claims.

Name and mailing address of the international
preliminary examining authority:



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PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 79597 OC/No	FOR FURTHER ACTION		See Form PCT/PEA/416																								
International application No. PCT/DK2004/000655	International filing date (<i>day/month/year</i>) 28.09.2004	Priority date (<i>day/month/year</i>) 29.09.2003																									
International Patent Classification (IPC) or national classification and IPC F41H5/04, C04B38/00																											
Applicant DEMEX R D GIVEN DE INGENI RER AS ET AL.																											
<ol style="list-style-type: none"> 1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36. 2. This REPORT consists of a total of 7 sheets, including this cover sheet. 3. This report is also accompanied by ANNEXES, comprising: <ol style="list-style-type: none"> a. <input checked="" type="checkbox"/> <i>sent to the applicant and to the International Bureau</i> a total of 3 sheets, as follows: <ul style="list-style-type: none"> <input type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions). <input checked="" type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box. b. <input type="checkbox"/> (<i>sent to the International Bureau only</i>) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions). 																											
<ol style="list-style-type: none"> 4. This report contains indications relating to the following items: <table style="width: 100%; border: none;"> <tr> <td style="width: 10%;"><input checked="" type="checkbox"/></td> <td style="width: 15%;">Box No. I</td> <td>Basis of the opinion</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. II</td> <td>Priority</td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td>Box No. III</td> <td>Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. IV</td> <td>Lack of unity of invention</td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td>Box No. V</td> <td>Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. VI</td> <td>Certain documents cited</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. VII</td> <td>Certain defects in the international application</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. VIII</td> <td>Certain observations on the international application</td> </tr> </table> 				<input checked="" type="checkbox"/>	Box No. I	Basis of the opinion	<input type="checkbox"/>	Box No. II	Priority	<input checked="" type="checkbox"/>	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability	<input type="checkbox"/>	Box No. IV	Lack of unity of invention	<input checked="" type="checkbox"/>	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement	<input type="checkbox"/>	Box No. VI	Certain documents cited	<input type="checkbox"/>	Box No. VII	Certain defects in the international application	<input type="checkbox"/>	Box No. VIII	Certain observations on the international application
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Date of submission of the demand 22.06.2005		Date of completion of this report 10.02.2006																									
Name and mailing address of the international preliminary examining authority: <div style="display: flex; align-items: center;"> <div> European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016 </div> </div>		Authorized Officer Lostetter, Y Telephone No. +31 70 340-1098																									



INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITYInternational application No.
PCT/DK2004/000655

10/573781

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4)
 - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

Description, Pages

1, 4 as originally filed

2, 3 received on 22.06.2005 with letter of 21.06.2005

Claims, Numbers

1-7 received on 22.06.2005 with letter of 21.06.2005

Drawings, Sheets

1/1 as originally filed

☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

4. ☒ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☒ the description, pages 2,3
- ☒ the claims, Nos. 1-7
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/DK2004/000655

Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

1. The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:
- ☐ the entire international application,
 - ☒ claims Nos. 1(in part),5
because:
 - ☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (specify):
 - ☒ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. 1(in part),5 are so unclear that no meaningful opinion could be formed (*specify*):
see separate sheet
 - ☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.
 - ☐ no international search report has been established for the said claims Nos.
 - ☐ the nucleotide and/or amino acid sequence listing does not comply with the standard provided for in Annex C of the Administrative Instructions in that:
 - the written form ☐ has not been furnished
 - ☐ does not comply with the standard
 - the computer readable form ☐ has not been furnished
 - ☐ does not comply with the standard
 - ☐ the tables related to the nucleotide and/or amino acid sequence listing, if in computer readable form only, do not comply with the technical requirements provided for in Annex C-*bis* of the Administrative Instructions.
 - ☒ See separate sheet for further details

**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/DK2004/000655

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1(in part)-4,6,7
	No: Claims	
Inventive step (IS)	Yes: Claims	
	No: Claims	1(in part)-4,6,7
Industrial applicability (IA)	Yes: Claims	1(in part)-4,6,7
	No: Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Re Item I

Basis of the report

The amendments filed with the letter dated 21.06.05 introduce subject-matter which extends beyond the content of the application as filed, contrary to Article 34(2)(b) PCT. The amendments concerned are the following:

- on page 2, line 5, the addition of "each of the particles having";
- on page 3, line 1, the addition of "The particles of";
- in claim 1, the addition of "each of the particles having".

A consequence of these amendments is that each of the particles of the ceramic material now presents a porosity defined by the parameter of the pore diameter. In the application as filed however, it was never mentioned that the particles presented a porosity, but that the ceramic material consisting of the individual particles presented a porosity (see for example page 2, lines 3-6 or claim 1 of the application as filed). The porosity originally disclosed was therefore referring to the voids between the particles of the ceramic material, not to voids inside the particles themselves.

This International Preliminary Examination Report is established as if the amendments filed with the letter dated 21.06.05 had not been made (Rule 70.2(c) PCT). The basis of this report is therefore the application as filed. Consequently, all the objections raised in the Written Opinion of the International Searching Authority remain valid and are hereafter repeated.

Re Item III

Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

Claims 1 and 5 as originally filed relate to an assembly for protection against an explosion defined by reference to the following parameter: the "physical extent" of the ceramic material included in the assembly.

The term "physical extent" has no well-recognised meaning and leaves the reader in doubt

as to the meaning of the technical feature to which it refers. The use of this parameter in the present context is therefore considered to lead to a lack of clarity within the meaning of Article 6 PCT. It is impossible to compare the parameter the applicant has chosen to employ with what is set out in the prior art. The lack of clarity is such as to render a meaningful complete opinion impossible. Consequently, this report has been restricted to:

- the subject-matter of claim 1 as originally filed, without the feature "a physical extent in the range of approximately 5 to 10 mm"; and
- the subject-matter of claims 2-4, 6 and 7 as originally filed.

Re Item V

**Reasoned statement with regard to novelty, inventive step or industrial applicability;
citations and explanations supporting such statement**

1. Reference is made to the following documents:

D1: FR-A-2827375
D2: WO-A-00/62007
D3: US-A-4415632

2. The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 1 does not involve an inventive step in the sense of Article 33(3) PCT.

- 2.1. The document D1 is regarded as being the closest prior art to the subject-matter of claim 1, and discloses (cf. page 4, line 22 - page 9, line 15; figures 1-3; the references in parentheses applying to this document):

an assembly for protection against an explosion, said assembly including a substantially plate-shaped multi-ply element formed by two outer walls (13, 19) and at least one intermediate layer (B, 11) of a particle-shaped material, whereby at least one layer of a particle-shaped material is a ceramic material.

- 2.2. The subject-matter of claim 1 therefore differs from this known assembly in that the

ceramic material presents a density in the range of approximately 0,3 to 2,5 g/cm³ and a pore diameter in the range of approximately 20 to 120 μ.

- 2.3. The problem to be solved by the present invention may therefore be regarded as providing an assembly with an improved protection against an explosion.
- 2.4. The solution proposed in claim 1 of the present application cannot be considered as involving an inventive step (Article 33(3) PCT) for the following reasons.
The claimed invention resides in the choice of particular parameters from a limited range of possibilities and it is clear that these parameters were encompassed by the prior art (cf. page 7, line 16 - page 8, line 12 of Document D2 which discloses an armour consisting of a ceramic having a density of 2,35 g/cm³ and column 2, lines 28-37 of Document D3 which discloses an armour consisting of a ceramic having a pore diameter in the range of 1 to 500 μ) and could be arrived at by routine trial and error (see also the PCT International Search and Preliminary Examination Guidelines Chapter 13.14(e)(ii)).
3. Dependent claims 2-4, 6, 7 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of inventive step, see documents D1-D3 and the corresponding passages cited in the search report.

the staff against explosions while simultaneously presenting a relatively low weight.

The above object is according to the invention obtained by at least one layer of a particle-shaped material being a ceramic material of a density in the range of approximately 0.3 to 1.5 g/cm³, each of the particles having a pore diameter in the range of approximately 20 to 120 μ and a physical size in the range of 0.5 to 10 mm.

The resulting assembly is relatively light and ensures a comparatively good protection against explosions. The ceramic material in question can be made of AlO₂, MgO and SiO₂ as well as mixtures or compositions thereof. Such a ceramic material turned out to be particularly energy-absorbing due to the fact that the energy of a blast wave resulting from an explosion hits the assembly and is accumulated therein because the ceramic material is caused to move. The latter movement of the ceramic material is caused by the individual particles sliding against one another and presenting such a fragile state that said ceramic material is crushed into a fine powder while being heated. As a result of the latter accumulation of energy and the continued movement of the blast wave into the vehicle in question in combination with the deformation of the remaining structural elements of the vehicle as well as the fact that the vehicle per se is raised or moved, the persons present inside such a vehicle do very likely survive such an explosion. A suitable dimensioning of the assembly in question as well as a suitable selection of wall materials, such as fibre-reinforced rubber material according to the invention, has the effect that the assembly can absorb at least 25% of the total energy optionally hitting such a vehicle.

According to the invention, the ceramic material may advantageously present a crystal size in the range of approximately 1 to approximately 20 μ .

In addition, the ceramic material may according to the invention advantageously present a density in the range of approximately 0.5 to approximately 0.95 g/cm³, and preferably in the range of 0.6 to 0.8 g/cm³.

The particles of the ceramic material may according to the invention also advantageously present a pore diameter in the range of approximately 30 to approximately 80 μ , and preferably in the range of approximately 45 to approximately 65 μ .

- 5 Finally according to the invention, the particles of the ceramic material may advantageously present a physical extent in the range of approximately 1 to approximately 7 mm, and preferably in the range of approximately 2 to approximately 5 mm.

Brief Description of the Drawing

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The invention is explained in detail below with reference to the drawing showing a cross sectional view of an assembly according to the invention.

Best Mode for Carrying out the Invention

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The assembly according to the invention shown in the drawing includes three layers, viz. a top outer wall 1 and a bottom outer wall 2 as well as an intermediate layer of ceramic material. The outer layers are made of a fibre-reinforced rubber material, and the intermediate layer includes a ceramic material presenting a density in the
20 range of approximately 0.3 to approximately 1.5 g/cm³, a pore diameter in the range of approximately 20 to 120 μ and a physical extent in the range of 0.5 to 10 mm. The ceramic material is of a crystal size in the range of approximately 1 to approximately 20 μ , it presents particularly advantageously a density in the range of approximately 0.5 to 0.95 g/cm³ and preferably in the range of 0.6 to 0.8 g/cm³, a pore diameter advantageously in the range of approximately 30 to approximately 80 μ and preferably
25 in the range of approximately 45 to approximately 65 μ as well as finally a physical extent advantageously in the range of approximately 1 to approximately 7 mm and preferably in the range of approximately 2 to approximately 5 mm.

- 30 The assembly is closed at the sides in such a manner that a flat closed pocket is formed between the outer walls 1 and 2, and the ceramic material is placed in said

Claims

1. An assembly for protection against an explosion, said assembly including a substantially plate-shaped multi-ply element formed by two outer walls (1, 2) and at least one intermediate layer (3) of a particle-shaped material, **characterised in that** at least one layer of a particle-shaped material is a ceramic material presenting a density in the range of approximately 0.3 to 1.5 g/cm³, each of the particles having a pore diameter in the range of approximately 20 to 120 μ and a physical size in the range of approximately 0.5 to 10 mm.
2. An assembly According to claim 1, **characterised in that** the ceramic material presents a crystal size in the range of approximately 1 to 20 μ .
3. An assembly according to claim 1 or 2, **characterised in that** the ceramic material presents a density in the range of approximately 0.5 to 0.95 g/cm³ and preferably in the range of approximately 0.6 to 0.8 g/cm³.
4. An assembly according to claim 1,2 or 3, **characterised in that** the particles of the ceramic material present a pore diameter in the range of approximately 30 to 80 μ and preferably in the range of approximately 45 to 65 μ .
5. An assembly according to claim 1,2, 3 or 4, **characterised in that** the particles of the ceramic material presents a physical size in the range of approximately 1 to 7 mm and preferably in the range of approximately 2 to 5 mm.
6. An assembly according to one or more of the preceding claims 1 to 5, **characterised in that** the outer walls (1, 2) are made of a metal material.
7. An assembly according to one or more of the preceding claims 1 to 6, **characterised in that** the outer walls (1, 2) are made of a fibre-reinforced rubber material.